Claims

[c1]   1.A machine life indicating system, comprising:

means for receiving historical data, the historical data providing an indication of the operating lifetime of major components within machines of a particular type;

means for calculating the life remaining in a machine using, at least in part, the historical data; and

means for displaying the life remaining in the machine.

[c2]   2.The system of claim 1, further comprising means for receiving environmental data pertaining to the environment in which the machine operates, and wherein the means for calculating the life remaining further comprises means for calculating the life remaining in the machine using, at least in part, the environmental data.

[c3]   3.The system of claim 1, further comprising means for receiving operator input data relating to the operation of the machine, and wherein the means for calculating the life remaining further comprises means for calculating the life remaining in the machine using, at least in part, the operator input data.

[c4]   4.The system of claim 1, wherein the means for calculat-

ing the life remaining in the machine comprise means for calculating the life remaining in the machine using probability distribution functions.

[c5]   5.The system of claim 1, wherein the means for calculating the life remaining in the machine using probability distribution functions comprises means for calculating the life remaining in the machine using probability distribution functions for individual components within the machine.

[c6]   6.The system of claim 5, wherein the machine is an electric motor and the individual components comprise components selected from the group consisting of a stator and a bearing.

[c7]   7.The system of claim 1, wherein the machine is selected from the group of machines consisting of a transformer, a wind turbine, and a generator.

[c8]   8.The system of claim 1, wherein the means for receiving historical data is operable to receive the historical data from a device other than the machine.

[c9]   9.The system of claim 1, wherein the means for receiving historical data is operable to receive the historical data in batch form such that the historical data is not continuously or intermittently received by the means for receiv-

ing.

[c10]   10.The system of claim 1, wherein the machine is within a class of machines defined by the machines of the particular type.

[c11]   11.The system of claim 1, wherein the means for calculating the life remaining in a machine comprises means for calculating the life remaining in the machine based on the life remaining in at least one component within the machine.

[c12]   12.The system of claim 11, further comprising means for displaying the life remaining in the at least one component within the machine.

[c13]   13.A machine life indicating system, comprising:
means for receiving operator input data, the operator input data providing information specific to the operation history of a machine;
means for calculating the life remaining in the machine using, at least in part, the operator input data; and
means for displaying the life remaining in the machine.

[c14]   14.The system of claim 13, further comprising means for receiving environmental data pertaining to an environment in which the machine operates, and wherein the means for calculating the life remaining further com-

prises means for calculating the life remaining in the machine using, at least in part, the environmental data.

[c15] 15. The system of claim 13, further comprising means for receiving historical data, the historical data providing an indication of the operating lifetime of major components within machines of a particular type, wherein the machine is of the particular type, and wherein the means for calculating the life remaining further comprises means for calculating the life remaining in the machine using, at least in part, the operator input data.

[c16] 16. The system of claim 13, wherein the means for calculating the life remaining in the machine comprise means for calculating the life remaining in the machine using an L_{10} life calculation.

[c17] 17. The system of claim 13, wherein the means for calculating the life remaining in the machine comprise means for calculating the life remaining in the machine based at least in part on the insulation class of the machine.

[c18] 18. The system of claim 13, wherein the means for calculating the life remaining in the machine comprise means for calculating the life remaining in the machine based at least in part on a insulation resistance test class of the machine.

[c19] 19.The system of claim 13, wherein the means for calculating the life remaining in the machine using probability distribution functions comprises means for calculating the life remaining in the machine using probability distribution functions for individual components within the machine.

[c20] 20.The system of claim 13, wherein the machine is selected from the group of machines consisting of a transformer, a wind turbine, an electric motor, and a generator.

[c21] 21.The system of claim 13, wherein the means for receiving operator input data is operable to receive the operator input data such that the operator input data is not continuously received by the means for receiving.

[c22] 22.The system of claim 13, wherein the machine is within a class of machines defined by the machines of the particular type.

[c23] 23.The system of claim 13, wherein the means for calculating the life remaining in a machine comprises means for calculating the life remaining in the machine based on the life remaining in at least one component within the machine.

[c24] 24.A method for calculating the life remaining in a machine, comprising:

receiving historical data, the historical data providing an indication of the operating lifetime of major components within machines of a particular type;

calculating the life remaining in a machine using, at least in part, the historical data; and

displaying the life remaining in the machine.

[c25] 25.The method of claim 24, further comprising receiving environmental data pertaining to the environment in which the machine operates, and wherein the step of calculating further comprises calculating the life remaining in the machine using, at least in part, the environmental data.

[c26] 26.The method of claim 24, further comprising receiving operator input data relating to the operation of the machine, and wherein the step of calculating further comprises calculating the life remaining in the machine using, at least in part, the operator input data.

[c27] 27.The method of claim 24, wherein the step of calculating the life remaining in the machine comprises calculating the life remaining in the machine using probability distribution functions.

[c28] 28. The method of claim 24, wherein the step of calculating the life remaining in the machine using probability distribution functions comprises calculating the life remaining in the machine using probability distribution functions for individual components within the machine.

[c29] 29. The method of claim 28, wherein the machine is an electric motor and the individual components comprise components selected from the group consisting of a stator and a bearing.

[c30] 30. The method of claim 24, wherein the machine is selected from the group of machines consisting of a transformer, a wind turbine, and a generator.

[c31] 31. The method of claim 24, wherein the step of receiving historical data comprises the step of receiving the historical data from a device other than the machine.

[c32] 32. The method of claim 24, wherein the step of receiving historical data comprises receiving the historical data in batch form such that the historical data is not continuously or intermittently received by the means for receiving.

[c33] 33. A method for calculating the life remaining in a machine, comprising:
receiving operator input data, the operator input data

providing information specific to the operation history of a machine;

calculating the life remaining in the machine using, at least in part, the operator input data; and

displaying the life remaining in the machine.

[c34]   34.The method of claim 33, further comprising the step of receiving environmental data pertaining to an environment in which the machine operates, and wherein the step of calculating further comprises calculating the life remaining in the machine using, at least in part, the environmental data.

[c35]   35.The method of claim 33, further comprising the step of receiving historical data, the historical data providing an indication of the operating lifetime of major components within machines of a particular type, wherein the machine is of the particular type, and wherein the step of calculating further comprises calculating the life remaining in the machine using, at least in part, the operator input data.

[c36]   36.The method of claim 33, wherein calculating the life remaining in the machine comprises calculating the life remaining in the machine using an L_{10} life calculation.

[c37]   37.The method of claim 33, wherein calculating the life

remaining in the machine comprises calculating the life remaining in the machine based at least in part on the insulation class of the machine.

[c38] 38. The method of claim 33, wherein calculating the life remaining in the machine comprises calculating the life remaining in the machine based at least in part on a insulation resistance test class of the machine.

[c39] 39.The method of claim 33, wherein calculating the life remaining in the machine using probability distribution functions comprises calculating the life remaining in the machine using probability distribution functions for individual components within the machine.

[c40] 40.The method of claim 33, wherein the machine is selected from the group of machines consisting of a transformer, a wind turbine, an electric motor, and a generator.

[c41] 41.The method of claim 33, wherein receiving operator input data comprises receiving operator input data such that the operator input data is not continuously received.

[c42] 42.A machine life indicating system, comprising:
an assessment tool, the assessment tool operable to receive historical data, the historical data providing an indication of the operating lifetime of major components

within machines of a particular type;

an analysis application, the analysis application operable to calculate the life remaining in a machine using, at least in part, the historical data; and

a display in communication with the analysis application, operable to display the life remaining in the machine.

[c43] 43. The system of claim 42, wherein the assessment tool is operable to receive environmental data pertaining to the environment in which the machine operates, and wherein the analysis application is operable to calculate the life remaining in the machine using, at least in part, the environmental data.

[c44] 44. The system of claim 42, wherein the assessment tool is operable to receive operator input data relating to the operation of the machine, and wherein the analysis application is operable to calculate the life remaining in the machine using, at least in part, the operator input data.

[c45] 45. The system of claim 42, wherein the analysis application is operable to calculate the life remaining in the machine using probability distribution functions.

[c46] 46. The system of claim 42, wherein the analysis application is operable to calculating the life remaining in the machine using probability distribution functions for indi-

vidual components within the machine.

[c47]   47. The system of claim 46, wherein the machine is an electric motor and the individual components comprise components selected from the group consisting of a stator and a bearing.

[c48]   48. The system of claim 42, wherein the machine is selected from the group of machines consisting of a transformer, a wind turbine, and a generator.

[c49]   49. The system of claim 42, wherein the assessment tool is operable to receive the historical data from a device other than the machine.

[c50]   50. The system of claim 42, wherein the assessment tool is operable to receive the historical data in batch form such that the historical data is not continuously or intermittently received by the assessment tool.

[c51]   51. The system of claim 41, wherein the analysis application is operable to calculate the life remaining in the machine based on the life remaining in at least one component within the machine.

[c52]   52. The system of claim 51, wherein the display is operable to display the life remaining in the at least one component within the machine.

[c53] 53.A machine life indicating system, comprising:

an assessment tool operable to receive operator input data, the operator input data providing information specific to the operation history of a machine;

an analysis application, in communication with the assessment tool, the analysis application operable to calculate the life remaining in the machine using, at least in part, the operator input data; and

a display for displaying the life remaining in the machine.

[c54] 54.The system of claim 53, wherein the assessment tool is further operable to receive environmental data pertaining to an environment in which the machine operates, and wherein the analysis application is operable to calculate the life remaining in the machine using, at least in part, the environmental data.

[c55] 55.The system of claim 53, wherein the assessment tool is further operable receive historical data, the historical data providing an indication of the operating lifetime of major components within machines of a particular type, wherein the machine is of the particular type, and wherein the analysis application is operable to calculate the life remaining in the machine using, at least in part, the operator input data.

[c56] 56. The system of claim 55, wherein the assessment tool is operable to calculate the life remaining in the machine using probability distribution functions for individual components within the machine, wherein the historical data may be modified to reflect newly gathered machine repair information, and wherein the newly gathered repair information increases the accuracy of the probability distribution functions for the individual components to improve the accuracy of the calculated life remaining.

[c57] 57. The system of claim 53, wherein the assessment tool is operable to calculate the life remaining in the machine using an L_{10} life calculation.

[c58] 58. The system of claim 53, wherein the assessment tool is operable to calculate the life remaining in the machine based at least in part on the insulation class of the machine.

[c59] 59. The system of claim 53, wherein the assessment tool is operable to calculate the life remaining in the machine based at least in part on a insulation resistance test class of the machine.

[c60] 60. The system of claim 53, wherein the assessment tool is operable to calculate the life remaining in the machine using probability distribution functions for individual

components within the machine.

[c61] 61. The system of claim 53, wherein the machine is selected from the group of machines consisting of a transformer, a wind turbine, an electric motor, and a generator.

[c62] 62. The system of claim 53, wherein the assessment tool is operable to receive operator input data via a wide area network from a plurality of users.

[c63] 63. The system of claim 53, wherein the assessment tool is operable to receive historical data via a wide area network from a plurality of users, the historical data providing an indication of the operating lifetime of major components within machines of a particular type, and wherein the machine is of the particular type.

[c64] 64. The system of claim 53, wherein the analysis application is operable to calculate the life remaining in the machine based on the life remaining in at least one component within the machine.